Guiding visitors in museums with calm interactions

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Abstract

We present two design solutions and an experimental platform that highlight the benefits of tangible interfaces in guiding visitors in museums while ensuring a better distribution of their attention between the exhibition and the guidance. We explore the use of the interaction-attention continuum of Bakker et al. to design interfaces that allow the visitor to regulate his attention at different times of the visit. The Visiting Stick draws on the walking habits and the Marauder's Brochure extends the use of a recurring museum object, the visit brochure, by augmenting it with a dynamic display and various tactile and kinesthetic modalities. We have thus designed and built a physical experimental platform using several sensory channels: visual, audio and haptic (using heat, vibration and change of shape) to guide visitors. This platform will allow us in future work to compare the different modalities and their combination for guiding in the museum.

Keywords 1

Tangible Interaction; Calm technology; Interaction-Attention continuum; Museum; Guiding

1. Introduction and State of the Art Analysis

How to guide a visitor or a group of visitors during a visit to a museum without overriding their sensory experience of the museum and diverting their attention from the exhibits? The challenge is to complete the physical space of the museum and to superimpose information on the existing without occulting the artworks or the architecture of the space. Mobile technologies such as smartphone applications or multimedia guides distract the attention from the environment and cut visitors off from the content presented [1]. This is in line with Weiser and Brown's reflections on "calm technology" and the need for ubiquitous computing to blend into everyday life by operating at the periphery of attention [2]. Calm technology enables a simple shift from central to peripheral attention and vice versa and enriches the periphery with informative details that lower the user's cognitive load [2]. TUIs are particularly appropriate for peripheral interactions since tangible elements are usually directly accessible (unlike a smartphone that needs to be unlocked), require less visual attention, and allow for consistent interactions along the interaction-attention continuum [3]. We therefore explore the contributions of tangible interactions for guiding visitors in museums.

Since the 80s, museums have been offering digital mobile tools to guide visitors and provide them cultural interpretation content besides traditional guided tours. These tools have evolved from simple audio content to rich interactive multimedia applications that can provide location-based information. Visitors can thus be guided in real time according to the narrative flow [4] or use an interactive map to self-orientate [5]. We have classified the different features of a guiding tool, identified from the related work, according to the interaction-attention continuum[1] [3] depending on the level of attention required and the precision of the associated interactions (Figure 1). We chose to also include a very general need

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[1] Bakker and Niemantsverdriet extend the notion of peripheral interaction to take into account the entire interaction-attention continuum from focused to peripheral to implicit interactions.[3].

to “visit the museum” in the focused interactions, in order to keep in mind that the visiting experience is paramount. Most of the related works address these needs with focused interactions (e.g. scanning a QRCode) or implicit interactions (e.g. detection of an iBeacon), but none take full advantage of the whole continuum to continuously shift between the different tasks involved in the visit of a museum.

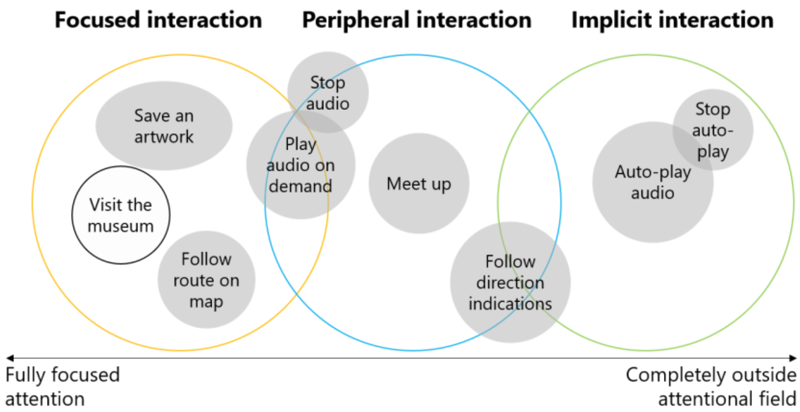

Figure 1: Distribution of a guiding tool features along the interaction-attention continuum of Baker et. al.

We have also identified a set of constraints and requirements to consider when designing guiding tools, in addition to visitor attention management. Thus, the visiting device must not hinder the visitor in his interaction with the museum's devices or be too heavy [6]. Social interaction is also essential in a museum visit [7], the design of a visitor support system should therefore take into account group interactions, in order to avoid isolating the visitor [8]. The devices should also allow visitors to separate and rejoin according to their wishes and the times of the visit [9].

Existing works show that many approaches have been explored to provide multimedia content that is best suited to visitors, that does not disrupt the social aspect of the visit and does not compete with the exhibit. However, this content is generally played specifically for each artwork (on demand or automatically), without providing visitors with a comprehensive narrative visit itinerary. Works dealing with this type of guidance indicate that this problem remains open [4], [5].

In recent years, the widespread adoption of tablets and smartphones has led museums to adopt the "Bring Your Own Device" policy. However, Petrelli et al. have shown that visitors might prefer a museum-specific device, a tangible interface designed specifically for the exhibition [10]. Furthermore, Bakker et al. have shown that TUIs are well suited for continuous shift along the interaction-attention continuum [3]. We therefore explored tangible design solutions to guide visitors through the museum based on the requirements and needs listed above. We have studied two metaphors to guide visitors. The first one explores the walking, while the second one focuses on the museum context and the tour brochures.

2. Visiting Stick and Marauder’s Brochure

Visiting stick: When arriving at the museum, the visitor is equipped with a Visiting Stick and headphones and chooses (explicit interaction) to attach badges corresponding to his visiting preferences (Figure 2). As he walks through the museum, the stick vibrates to show him the direction to follow, like a divining rod. Depending on the way he holds the stick, it is active (vertical, end in the hand) or in pause (horizontal, held by the middle). Changing between modes is thus done through a peripheral interaction that does not capture the visitor's attention. When approaching a point of interest, multimedia content customized according to the badges on his stick is automatically triggered (implicit interaction). The visitor can add badges on his stick at each kiosk to deepen a subject or choose another theme. This first design solution harnesses interactions known to all walkers with an object that enables the whole interaction-attention continuum to be explored. The stick only requires one hand and hence is not cumbersome. It can reduce visitor fatigue by allowing them to lean on it and can be shared easily among the group. However, the social aspect is not further addressed since the solution was designed for a single visitor.

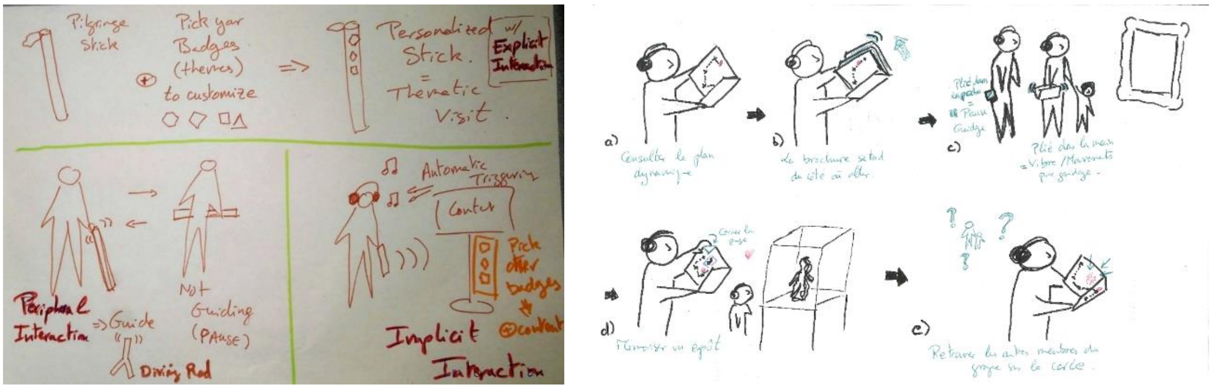

Figure 2: Two solutions to guide museum visitors. Left the Visiting Stick and right the Marauder's Brochure.

The Marauder's Brochure: For this second design, we were inspired by an already existing object to guide visitors: the brochure distributed at the reception desk. It allows visitors to understand the museum's organization, to find objects of interest and has several advantages: it is compact, several people can look at it together and it folds up to be stored in a pocket. In order to extend the functionality of this object to meet the needs, we were inspired by a popular culture artifact that "magically enhances" a paper map: the Harry Potter's "Marauder's Map" ™. When visitors arrive at the museum, they pick up paired Marauder Brochures that contain the visit. The Brochure provides an overview of the itinerary (explicit interaction). Visitors can then follow the visit by consulting the map dynamically updated with their position. Each user can fold the Brochure to hold it in his hand, which then bends in the direction to follow. He can also place it in his pocket, which pauses the guidance. Switching between these different modes – precise center-of-attention guidance, imprecise peripheral guidance, and pausing without attention – is achieved through simple peripheral interactions consistent with the metaphor of a paper sheet. When arriving in front of a point of interest, the audio content is automatically triggered (implicit interaction) and the visitor can bookmark the artwork by cornering the Brochure (explicit interaction). If the group splits up, each visitor can see where the others are on the unfolded Brochure (explicit interaction) to decide whether to join them or take their time.

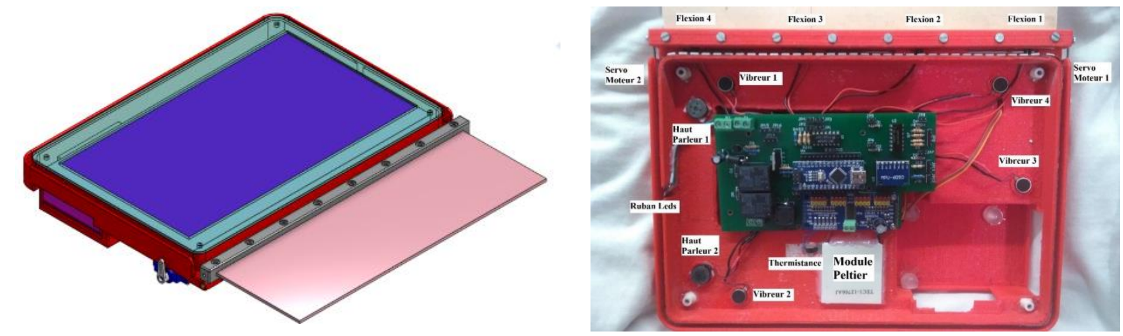

Figure 3: Experimental platform for the Marauder's Brochure.

From a technological point of view, this prototype is inspired by work on flexible, deformable and foldable electronic ink screens [11] and shape-changing surfaces [12]. We have built an experimental platform that uses as output the visual channel (precisely via a screen and more loosely with light signals) the haptic channel with vibrations, movements and temperature changes, and the auditory channel with sound signals. In input it detects the surface deformation, as well as the movements and changes of orientation of the user. For cost reasons and simplicity of integration, this first version was made from a touch tablet incorporated in a 3D printed box, where only a part is flexible and mobile (Figure 3).

3. Prospect

One future step is the analysis of the visitors' activity and needs in a museum in order to better support the design choices. In parallel, we plan to consolidate the experimental platform and to experiment between the different modes of interaction envisioned. This first prototype will thus allow us to compare different guiding modes: by temperature ("hot/cold" game), vibration (patterns or localization), interface deformation, light, screen and sound (the two latter being rather control conditions, the visual and auditory channel are already used for the museum visit, interpretation contents and social interactions). Thermal feedback has been little studied so far in HCI compared to tactile feedback [13]. Shape-shifting interfaces have also been little explored for guiding [14]. These first tracks seem encouraging for experimenting with guiding visitors in museums using less explored sensory modalities such as heat or shape changing interface.

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